British Birds

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E. D. H. Johnson

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Studies of less familiar birds: III—Eleonora's Falcon
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(with five plates)

The taxonomy of the redpolls
Kenneth Williamson

Notes **Review** **Letters**

Three Shillings

June 1961

British Birds

AN ILLUSTRATED MONTHLY JOURNAL

Edited by

P. A. D. Hollom E. M. Nicholson
I. J. Ferguson-Lees Stanley Cramp

Photographic Editor: Eric Hosking

Hon. Editors: W. B. Alexander N. F. Ticehurst

Editorial Address: 30 St. Leonard's Avenue, Bedford

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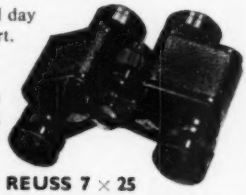

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British Birds

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JUNE 1961

The pair relationship and polygyny in the Stonechat

By E. D. H. Johnson

THE MOST CASUAL OBSERVER cannot fail to be impressed by two characters of the Stonechat (*Saxicola torquata*)—its striking sexual dimorphism and the fact that it is seen to be paired at all seasons.

During a twelve-year study of the species, chiefly in Jersey in the Channel Islands, but also on the continent of Europe, one of my principal objects was to investigate the function of these two characters within the pair relationship. The work of Lebeurier and Rapine (1936) in Brittany in the early thirties of this century and of the Parrinders (1945) in Devon in 1943 and 1944 has provided the greater part of what is known of the Stonechat's breeding biology, but the revelation of individual life histories, in the field, had to await the development of trapping and colour-marking techniques.

The area I chose for my work was a two-and-a-half-mile stretch of coastal dunes and marram-covered wasteland with small areas of reed-bed and gorse extending a quarter of a mile inland, in St. Ouen's Bay, Jersey. The technique employed was to colour-ring as many birds as possible, of all ages, at all seasons of the year and to visit them on every possible occasion, noting all behaviour, however trivial, and the relationships between individuals. The work was particularly intensive between the autumn of 1954 and the winter of 1958, when almost complete coverage was achieved in the ringing of adults and all nests in the area were found. The following is a report on experiences with some 510 colour-marked birds.

INITIAL PAIR-FORMATION

Stonechats pair after the assumption of their first-winter plumage. On arrival in their wintering area, either by dispersal from elsewhere in the locality, or by immigration from farther afield, birds of the year

intermingle with residents which have bred in the district and which are just emerging from their moult. During this period, which may extend from late August to early October, according to the length and success of the breeding season, the pair-bond of the old birds is relaxed and exchanges of mates may take place. Pair-formation is initiated by the males excitedly chasing the females with loud "chacking" calls; and by the end of October all couples occupy and defend territories, in which they remain for the winter.

THE WINTER TERRITORY

During November, the male perches conspicuously on prominent features within, and bordering, the territory and initiates each move of the pair thereby, patrolling and defining the boundaries. The female perches lower and less conspicuously. Gradually this relationship gives place to a levelling of the parts played by the sexes until, with their own and their neighbours' territorial boundaries well defined, and their activities devoted primarily to obtaining food, the pair remain principally on the ground as they feed. The male no longer shows his breast and under-parts and becomes as inconspicuous as the female, both thereby becoming less vulnerable to avian predators. This feeding behaviour characterises the movements of the pair throughout December and January, and undoubtedly gives rise to many of the reports of Stonechats leaving areas in which they must obviously winter. At this season they may even join flocks of finches which forage through their territories.

The winter territory, depending on topography, may be as large as 150 yards in diameter and while feeding on the ground the pair may be separated at times by as much as fifty yards. Such separation seldom lasts long, however, and one or other of the birds, on finding itself isolated from its mate, will rise in the air and hover to locate it, then rejoin it at speed, flying close to the ground.

COURTSHIP AND THE COLLAPSE OF THE PAIR-BOND

In late January the pair begin to behave less furtively again. Territorial activity increases in intensity, with re-established boundaries, and increasing initiative is taken by the male, who begins to sing about 14th February. The intensity of song is dependent upon the number of adjacent males and the extent to which they intrude. In years of low population-density song may be heard very rarely. No observations were made of a direct relationship between song and courtship. Courtship begins in early March, the male chasing the female around the territory in aerobatic flights, calling with a loud "chacking". The chasing gradually increases in frequency and intensity until, at a time when the birds have arrived at an advanced state of physical

excitement, the pair-bond is suddenly relaxed and, for a period varying from a few hours to three or four days, the birds in adjacent territories may be seen intermingling, with little or no aggressive behaviour. This event shows a remarkable synchronism throughout the population. The pair-bond is restored as suddenly as it was broken and by the time that territorial behaviour is resumed some exchanges of mates have taken place. The majority of pairs, however, continue paired as before.

The function of this sudden collapse of the pair-bond, at such a critical stage in pre-nuptial development, is of intense interest, but, once it has been recognised and accepted, a number of explanations suggest themselves.

In areas where the Stonechat is a winter visitor, the occurrence of such a break in the pair-bond may precede departure on northward migration in spring. Similarly, where the species is principally resident, the phenomenon may ensure the integration of newly arrived spring migrants into the population with the greatest economy of effort, at a time when all birds are in a condition of advanced sexual development, and assist the pairing of sexually matched individuals. Since close study of large numbers of Stonechats, in the field, has revealed appreciable differences in the intensity of behaviour of individual birds, the relaxation of the pair-bond in spring may also permit pair-formation between "compatible" males and females.

These hypotheses require, and are receiving, further investigation.

THE BREEDING CYCLE

Following re-affirmation of the pair-bond, the latter part of March is devoted to nest building. It is also a time of display, the male chasing the female around the territory between periods of feeding. Building takes place principally in the early mornings, but this is by no means an inflexible rule and it is rarely carried out with any great urgency unless it has been held up by bad weather. The male shepherds the female towards the nest site when she arrives with material, but he does not accompany her as he does when she is feeding. Occasionally the female may leave the territory completely to go to a place where suitable lining material is available, and then he remains conspicuously perched on his principal observation post which is by then an important feature of the territory.

The pair may become very much less conspicuous during the building period and it is at this time that what I have tentatively termed "false incubation" behaviour may take place. When this occurs, the female goes down in the vicinity of the unfinished nest whilst the male remains on guard, singing or feeding, exactly as if she were on eggs. Periodically, he calls her up and perches above her whilst she feeds.

I have, on several occasions, been misled by this behaviour into thinking that the female was incubating, when in fact she was only in the early stages of building. This behaviour can continue throughout the building period and merge with the true incubation pattern on completion of the clutch.

Mating usually takes place from one to four days before the first egg is laid. It is the culmination of the final phase of display in which chasing and "chacking" give place to visual stimuli effected via the white neck- and wing-patches of the male. Normally these are at least partially occluded by darker plumage, but as he crouches with his back to his mate, body bowed and trembling and wings drooping, they are exposed in such a manner as to appear almost to fluoresce.

Eggs are laid, in Jersey, quite consistently between 0600 and 0700 GMT, the female being accompanied to, or enticed towards, the nest by the male. During the laying period, the pair remain away from the immediate vicinity of the nest site, unless they are engaging in "false incubation".

Incubation begins as soon as the clutch is complete, but it may be delayed by adverse weather conditions, in which case the female becomes most inconspicuous away from the nest site and the male assumes a purely defensive rôle. From the start of the incubation period, he spends most of his time on the principal observation post, placed as conspicuously as possible, singing, hovering to greater height to observe intruders, and patrolling the boundaries of the territory.

A human or other animal intruder will cause the male to utter a warning *chuck* to the female, and when this is repeated with greater urgency she may slip quietly from the nest. More often than not, however, she remains on the nest, where, with her dull brown coloration, she is practically invisible in the entrance tunnel of grass or dead gorse. An intruding Stonechat will be sung at until the extent of his or her intrusion causes the defending male to move into the attack and an aerobatic chase ensues, with the defender invariably the victor.

A closer approach to the nest on the part of a dog, cat or human elicits a loud, insistent series of *whit . . . whit . . . whit . . . whit* calls from the male, who flies to a conspicuous perch away from the nest and from there starts an elaborate distraction display, rising and falling in hovering flight as if suspended on a string; after this he begins to move farther from the nest, sometimes dropping into cover, darting close to the ground in level flight to reappear ten yards farther away still, again hovering and bobbing to claim the intruder's attention. Meanwhile, the female, if she has left the nest, perches inconspicuously in a place of vantage, below the top of a bush or other feature, concealed by her drab coloration. If the intrusion occurs within a few feet of the nest she will join the male in making a clamour. Her dis-

traction display is not as elaborate as that of the male and she will normally perch closer to the intruder with a greater show of belligerency.

During incubation, the male calls the female off the nest at intervals varying from 45 to 75 minutes. He accompanies her as she feeds, perching above her as she moves about the territory. When she returns to the nest, he at once goes to his observation post and sings a few phrases before going down to feed himself. The young hatch after thirteen to fourteen days and for the first two to four days after this the male takes no part in feeding them, but continues with his defence of the territory, occasionally accompanying the female as she gathers food. By the fifth day, however, he is invariably carrying food and after this his territorial behaviour declines as he takes a larger share of the responsibility of caring for the brood.

On or about the twelfth day after hatching, the young begin to move around in the nest and even to leave it for short periods. At this time the alarm call undergoes a sudden change by the introduction of a second component, a *chack*. As the situation demands, either or both parent birds will utter a series of phrases which are a combination, in an irregular sequence, of *whit* and *chack*. Observation indicates that the *whit* component has the function of drawing attention to the adult bird which is calling, whilst the *chack* is used to communicate instructions and warnings to the young and between the pair.

The young finally leave the nest, one at a time, over a period of several hours. At this time the parents are in close attendance and the language consists of quiet "chacking" calls as the adults locate them in dense cover and feed them. After twenty-four hours the family party begins to move away from the immediate vicinity of the nest and the excitement diminishes.

By the end of a week the young are beginning to show themselves and the parents assume divergent roles again. The male takes charge of the young, leading them about the territory and sometimes beyond its bounds; feeding them progressively less until they no longer solicit food; chivvying them from their perches by diving at them and forcing them to fly; and calling them together at dusk to roost in close proximity. Whilst thus engaged, he begins to re-define the boundaries of the territory. He may resume song, and under cover of the general family activity he courts and mates with the female, who began to build her second nest when he assumed responsibility for the care of the young. During the second incubation period the male leads the young of the first brood out of the territory and they disperse. The cycle then continues as before.

Three broods are most commonly reared, but I have known four clutches to be laid and three broods fledged successfully from them

when the second brood was lost to a predator a few days before it was due to leave the nest.

DENSITY DEPENDENCE

Population density has an appreciable influence on the breeding activities and behaviour of the Stonechat, since the welfare of the pair depends largely upon the success of the male in his defensive task and the amount of effort he is required to devote to patrolling his borders and warning-off and chasing intruders. The significance of density dependence in the breeding biology of this species will be discussed more fully elsewhere, but it is appropriate to mention here that the number of broods is very much affected by the density. Of greater interest in the present context is the fact that, under conditions of low population density, males whose territorial boundaries do not march with those of another pair, and who are therefore relieved of the necessity to play an active part in defence, may take advantage of a slight numerical superiority of females in the vicinity. I have known three cases of polygyny in my study area, and these are discussed later in this paper.

AUTUMN DISPERSAL AND MIGRATION

The last brood of the season normally stays with the parents throughout the moult, during which time the old birds remain extremely inconspicuous within their territories. In early September, the young of the year begin to disperse; some may remain near the place of birth, but others migrate. It appears that, at least in Jersey, autumn migrants are invariably birds of the year. This is confirmed by a newly evolved ageing technique, based on the small amount of grey coloration within the mouths of young birds (E. D. H. Johnson in Cornwallis and Smith 1960). Other patterns of migration may, of course, be found throughout the species' wide distribution in the Old World.

One of the principal wintering grounds for northern Europe's emigrant Stonechats is the Iberian Peninsula, particularly along the south-east coast of the provinces of Malaga and Almeria, where, so J. A. Valverde informs me, it is the commonest bird in winter.

In one of the greatest concentrations of Stonechats that I have ever seen, near Estopona, on the south-east coast of Spain, in early November, pairs were defending territories less than fifty yards across and these abutted on one another for at least ten miles along the coast and a quarter of a mile inland. Here territorial behaviour was organised to the extent that both sexes played an equal part in a constant struggle to maintain the boundaries.

My own observations, particularly in Spain, have shown that, whilst they may not be paired when actually on the move, Stonechats rapidly

pair and take up territories in any area in which they pause on passage. Resident males may then sing in defence of their territories and their mates; while interlopers will chase females with loud "chackings" and (in at least one case in southern Spain) the display of white patches, indicating a high level of sexual excitement.

POLYGYNY

In the following discussion of the three cases of polygyny briefly mentioned above, reference is repeatedly made to a number of colour-ringed individuals. In the interests of clarity, however, actual colour-codes which involved the use of four rings, two on each leg, have been abbreviated.

The first case came to my notice in the spring of 1955, when a pair, the male of which had been colour-ringed Orange/Black in late January, began incubating on or about 23rd April. During the latter part of the incubation period, I noted that the male was dividing his time fairly evenly between the sitting female and an area at least four hundred yards to the south. On several occasions I saw him there in company with a female and it was soon apparent that she was much darker than his known mate, who was a particularly "ashy" bird. It was not until 16th May, however, the day after his known brood left the nest, that I found him carrying food to a second nest; this I located on the following day, when he was feeding a well-fledged brood of six young in company with the "dark" female. Extrapolation of the dates and data suggests that the first egg in the second nest was laid approximately two days after that in the first nest; and examination of my earlier notes in the light of my later knowledge showed that the male had been dividing his time between the two females in accompanying them to feed off the nest during the incubation period, and similarly in sharing with both of them the duties of feeding the young. The second female retired from the area whilst the male had charge of her young. The first female laid again within a few yards of her first nest.

The next two years produced two further cases of polygyny which I was more fully able to document, and which illustrate the extraordinary ability of the male to vary his behaviour to correspond with that of females in different stages of the breeding cycle.

The male of a pair caught and ringed in January 1955 was colour-coded Orange/Red. The following April, during the period of relaxed pair-bond, he changed his mate for a female who was colour-ringed Red/Green. They bred and remained paired until late October, when he again changed mates; the new female was ringed Orange/Blue. During the latter part of March the male began to divide his time between the territory they occupied and an area four hundred yards to

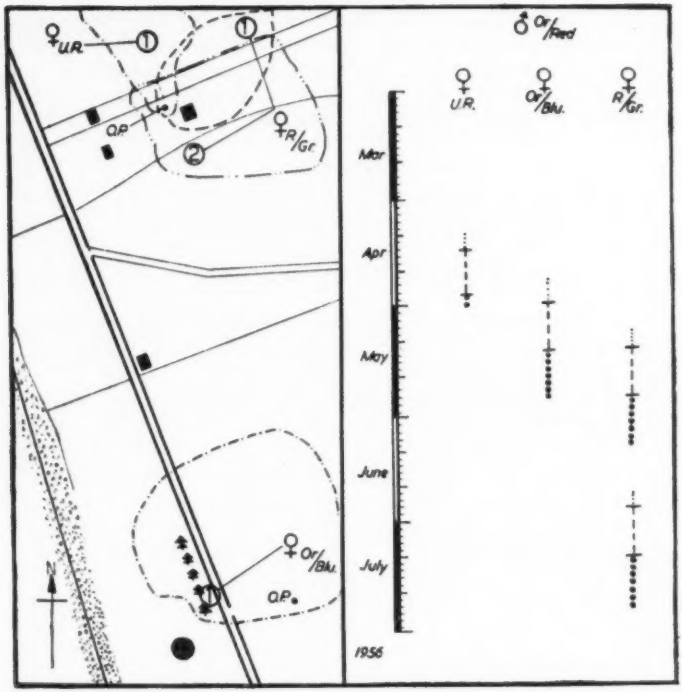

FIG. 1. Polygyny in the Stonechat (*Saxicola torquata*), St. Ouen's Bay, Jersey, Channel Islands, 1956. The territories concerned in the polygynous relationship between the male Orange/Red and three females, Unringed (U.R.), Orange/Blue and Red/Green. The area consists of marram-covered wasteland bordering the sea. The vertical side of the figure covers a distance of 500 yards. Nest-sites are represented by circles, while the numbers are the brood numbers of the females concerned. On the right of the plan is a seasonal comparison of the stages in the breeding cycle reached by each female; in this the small dots, dashes and large dots represent laying, incubation and fledging periods respectively

the north (Fig. 1) where he was frequently seen with an unringed female, holding a territory. He had a regular observation post in each territory, but only the more northerly one, at the top of an electricity pole, enabled him to overlook the whole area. Then on 4th and 5th April he was also seen in company with his mate of the previous season, Red/Green, who had appeared a hundred yards or so to the north-east of the territory which he occupied with the unringed female. He bred with all three females. The nests were

not found in the early stages of the breeding cycle in all cases, but the first egg was laid by the unringed bird about 9th April, by Orange/Blue on 22nd April and by his old mate, Red/Green, on or about 5th May. He was seen in courtship display with all three females and copulating with two of them. No other males were seen in the area at any time and the only other pair within half a mile occupied an extremely small territory some distance to the south.

Space does not permit a detailed description of the complete behaviour pattern of these four birds throughout the breeding season, but the following points are of greatest interest.

Between 10th and 22nd April, the male was simultaneously (1) escorting the unringed female, who was laying; (2) associating with Orange/Blue, four hundred yards to the south, in "false incubation" (page 215); and (3) engaging in desultory courtship with Red/Green a hundred and fifty yards to the east. All females at this time occasionally visited the area of his electricity pole observation post, although seldom more than one at a time. Each kept to her own territory, but there was a small irregularly shaped area of overlap, dictated by topography, around the base of the pole.

Later in this period, when the unringed female was incubating, the male would escort her off to feed and then, when she returned to the nest, he would go to the southern territory to sing on its perimeter and to escort the laying female Orange/Blue.

By 29th April, the unringed female's eggs had hatched and Orange/Blue was sitting. The male was devoting time to escorting the latter to feed, as well as to feeding the former's young. In addition, he was paying court more strongly to Red/Green, whose first egg was to be laid on or about 6th May. On 2nd May, the young in the unringed female's nest were taken by a predator and she retired from the scene. The male then divided his time equally between the two remaining females, commuting between the territories and behaving towards each female as he would have done if she had been his only mate. When passing from the feeding to the sitting female, he took the initiative in calling her off the nest. With so large a territory his defensive effect was necessarily somewhat incomplete, but distraction display was regularly resorted to if he happened to be present when an intruder appeared.

On 26th May the young left Orange/Blue's nest in the southern territory and the male was soon in attendance on the brood, at the same time helping Red/Green to feed her young which were still in the nest. Gradually, Orange/Blue's family party moved northward until, on 3rd June, they were on the edge of the territory occupied by Red/Green, whose young left the nest four days later. The family parties dispersed and all except the male and his old mate Red/Green had left

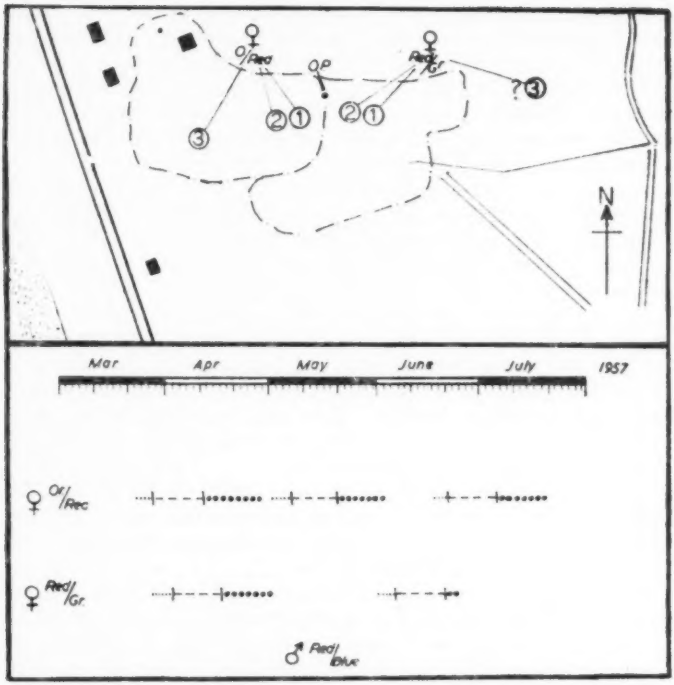

FIG. 2. Polygyny in the Stonechat (*Saxicola torquata*), St. Ouen's Bay, Jersey, Channel Islands, 1957. The territories concerned in the polygynous relationship between the male Red/Blue and two females, Orange/Red and Red/Green. The area consists of marram-covered wasteland bordering the sea. The horizontal side of the figure covers a distance of 500 yards. Nest-sites are represented by circles, while the numbers are the brood numbers of the females concerned. Below the plan is a seasonal comparison of the stages in the breeding cycle reached by each female; in this the small dots, dashes and large dots represent laying, incubation and fledging periods respectively

the area by the end of June. The first egg of their second clutch was laid on or about 22nd June. They reared their second brood successfully in a nest one hundred yards south-west of the first, and remained together in the territory until it was taken over by a young male paired with a young female who had been ringed as a wanderer in September.

The third case of polygyny follows on from the second and took place in the following year, 1957, in part of the same territory (Fig. 2). The young pair, the female ringed Orange/Red and the male later

ringed Black/Orange, remained in the territory throughout the winter. From 25th February the male was frequently seen in courtship display and this steadily gained in intensity until 5th March when the "chacking" and chasing continued even after dusk. The excitement was resumed on the morning of 6th March and at 0905 the male holding the territory was observed to be Red/Blue, a bird which had been ringed as a juvenile at the Jersey Bird Observatory half a mile to the south on 29th September in the previous autumn. The intensity of the courtship chase diminished thereafter, but the pair (now Red/Blue and Orange/Red) were still heard calling after dark until 12th March and they were seen in courtship display on 18th and 21st March. Their first egg was laid on or about 22nd March.

Meanwhile, on 15th March, the female Red/Green of the previous year had reappeared a hundred yards or so to the east. She was carrying nesting material and being escorted by the male (Red/Blue) on the 25th and her first egg was laid about two days later. From then onwards the behaviour pattern of the trio proceeded with almost textbook precision.

During the time that Orange/Red was incubating and Red/Green "false incubating", the male escorted each of them on their food sorties, calling them up from the nest in turn. The two females sometimes met on the boundary between their territories, but no animosity was ever shown as it would have been had they been females of monogamous pairs. The male chose a small hawthorn between the two nests for his observation post and gave warning, hid, or carried out distraction display, according to the demands of each type of intrusion.

Orange/Red's eggs hatched on 12th April and by the 15th the male was assisting her to feed the young, whilst still escorting Red/Green off the nest at the normal intervals. The latter's eggs hatched on the 16th and the male joined her in feeding the young two days later.

The male continued to divide his attention between the two females throughout the fledging period and after the young had left the nests. Then the two broods separated by a hundred yards or more and he commuted between them, chivvying the young, carrying out defensive action and defining the slightly changed boundaries of the territory. He paid a little more attention to Orange/Red than to Red/Green. The first egg of Orange/Red's second clutch was laid on 1st May, just four days after her first brood had left the nest. The male accompanied her off the nest during incubation, whilst escorting the young of the first brood. Red/Green and her brood left the area and she was not seen again until 26th May when Orange/Red's second brood were within a few days of leaving the nest. On that date, the male went through "false incubation" procedure with her, calling her out at intervals, whilst he assisted Orange/Red to feed at the nest. He sang

when Red/Green went to a place to which he chivvied her and on 29th May he copulated with her in an interval between carrying food to Orange/Red's nest. The first egg of her second clutch was laid the next day and she was later seen to be carrying lining material, escorted as far as the boundary of the territory by the male.

Orange/Red's second brood left the nest and her third clutch was laid whilst Red/Green was incubating. The male divided his attentions appropriately between them until Red/Green's young were taken by a predator on 22nd June. She then disappeared until 22nd July, leaving the male to give his undivided attention to Orange/Red.

When Red/Green returned to the territory after a month's absence, however, she was again escorted and courted by the male, who was by then wandering with Orange/Red's third brood. It is probable that Red/Green reached the "false incubation" stage of a third brood, but she went into moult and breeding activity declined throughout the territory in late July.

The trio remained in the territory until it was invaded by young of the year in late August. Orange/Red was seen with one of her own third brood, a male Two/Blue, on 28th August. It is believed that this male afterwards migrated for the winter, but he returned in the following spring and sired three broods out of his mother.

DISCUSSION

On the above evidence, it is clear that sexual dimorphism in the Stonechat is inseparable from the differences which exist between the active and conspicuous rôle of the male and the relatively passive and inconspicuous rôle of the female. It ensures pairing at the earliest possible age, as soon as juvenile plumage has served its function of concealment. The effect is minimal in winter, when territorial behaviour is at its lowest intensity and when both sexes primarily show their cryptic upper-parts.

At all other seasons the male assumes an attitude of physical dominance, his conspicuously patterned black, white and chestnut head, throat and breast enabling him to obtain a mate, court her and defend her and their territory with the minimum of physical effort. The dull coloration of the female, on the other hand, is adapted to her tasks of incubation and of brooding and feeding the young, with the maximum of concealment.

Whilst the Stonechat is normally paired at all seasons, except when actually migrating, it is not true to say that it pairs for life, as there are two periods in the annual cycle, in spring and autumn, when changes of mates may take place. The vernal relaxation of the pair-bond has already been discussed above. The autumnal relaxation, occurring at the time of greatest mortality amongst adults, serves to preserve the

vitality of pairs within a population and to establish pair relationships for the winter, again with the greatest economy of effort.

SUMMARY

(1) Stonechats (*Saxicola torquata*) pair after the assumption of first-winter plumage, and remain paired throughout the winter.

(2) The pair-bond is relaxed in spring for a very short period, at an advanced stage in sexual development, and changes of mates may take place.

(3) During the whole of the breeding cycle the rôle of the male is active and conspicuous and that of the female passive and inconspicuous. The male uses his advertisement patterning to defend the territory with the minimum of effort, whilst the female takes advantage of her cryptic coloration.

(4) Males may engage in polygynous relationships with two or more females and are able to adapt their behaviour to that of females in different stages of the breeding cycle.

(5) During and after the moult period, in autumn, mates may again be changed. This integrates new arrivals into the population.

(6) Stonechats tend to pair when they pause on passage in autumn.

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Movements and seasonal variation in mortality of Shags and Cormorants ringed on the Farne Islands, Northumberland

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INTRODUCTION

THE ECOLOGY OF the Shag (*Phalacrocorax aristotelis*) and the Cormorant (*Ph. carbo*) has been discussed by Lack (1945) as an example of closely related species which can co-exist in the same area. He showed that the two species had different nest-site preferences and that their food and probably their feeding areas were different.

In the present study, an analysis of the recoveries of Cormorants and Shags ringed on the Farne Islands, Northumberland, shows further ecological differences between the two species.

FIG. 1. Recoveries during the first year of life of Cormorants (*Phalacrocorax carbo*) ringed on the Farne Islands, Northumberland. Filled circles show recoveries between October and March inclusive; and crosses recoveries between April and September. The large open circle at Berwick-on-Tweed indicates 49 recoveries during the "winter" and two during the "summer". One recovery in Spain is omitted

METHODS

A total of 230 recoveries of Cormorants and 127 of Shags ringed on the Farne Islands form the basis of this study. Those of birds ringed up to and including 1959 and recovered before 1st October 1960 have been used. There is therefore a bias, in that proportionately more first-year birds are included, but since ring loss occurs in both species (Kortlandt 1942, Coulson and White 1957), such a bias already exists. Because of this, no attempt has been made to estimate the annual mortality rate from the ringing recoveries, but it has been shown that the adult mortality of both species is very low (Kortlandt; Coulson and White), while the first-year mortality is probably very high (Stuart 1948, Coulson and White).

All Cormorant recoveries and the great majority of those of the Shag are of birds ringed as nestlings. Subsequent recaptures and recoveries of these ringed birds suggest that most individuals which survive to breed, do so in their natal area.

The Cormorants and Shags nest within a mile of each other on the Farne group, but on different islands. Thus their movements, if they behave in a similar manner, can be expected to be influenced equally by topographical factors. If differences occur in the movements of the two species, they can be regarded as indicating differences in their ecology.

All differences have been examined statistically. The significances have been determined by calculating χ^2 from contingency tables after applying Yates's correction.

FIG. 2. Recoveries after the first year of life of Cormorants (*Phalacrocorax carbo*) ringed on the Farne Islands, Northumberland. Symbols as in Fig. 1. The large open circle at Berwick-on-Tweed indicates seven recoveries during the "winter" and 12 during the "summer". One recovery in south-west France and one in Spain are omitted

TABLE 1—RECOVERIES OF CORMORANTS (*Phalacrocorax carbo*) AND SHAGS (*Ph. aristotelis*) NORTH OR SOUTH OF THE FARNE ISLANDS, NORTHUMBERLAND, IRRESPECTIVE OF LONGITUDE

		First-winter		First-summer		After first-summer	
		No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Cormorant	North	94	63.5%	10	40%	38	56%
	South	54	36.5%	15	60%	19	44%
Shag	North	25	29%	18	78%	10	55.5%
	South	61	71%	5	22%	8	44.5%

MOVEMENTS

The records have been grouped according to whether the birds were recovered in their first year or later and whether they were recovered between October and March inclusive (subsequently referred to as "winter") or between April and September ("summer"). The recoveries are shown in Figs. 1 and 2 for the Cormorants and Figs. 3 and 4 for the Shags, dots indicating "winter" ones and crosses birds recovered in the "summer".

1. *Movements of first-year and older birds*

In both the Cormorant and the Shag, the movements in the first winter are greater than those which occur in subsequent winters. This is particularly evident in the Shag (Figs. 3 and 4) where there are only two recoveries of birds over one year old beyond Northumberland and Berwickshire.

The percentages of first-winter, first-summer and older Shags and Cormorants which were recovered north or south of the Farne Islands are shown in Table 1. It is evident that more first-winter Cormorants are recovered to the north of the Farnes, while more Shags of the same age are recovered to the south ($P<.01$). In the first summer the position is reversed; more Cormorants are recovered south of the Farnes and more Shags to the north ($P<.01$).

The above conclusion takes no account of the actual distances moved. First-winter Cormorants move north only as far as the Aberdeenshire coast, but Shags of a similar age penetrate north to the Shetlands. First-winter Cormorants move farther south than Shags, reaching the Atlantic coast of France and, in two instances, Spain; Shags reach only the latitude of the south coast of England.

Thus the Shags disperse almost as far north as they do south during the first winter, but the Cormorants may move about three times as far south as north.

2. Migration

There is no evidence of a true migration in the Shag. First-winter and first-summer birds disperse along the coastline. The fact that there are so few Shags recovered on the Continental side of the North Sea is good evidence that this dispersion is merely coastal and not radial.

First-winter and first-summer Cormorants also show a marked dispersion which, like that of the Shags, is also coastal (there are no recoveries on the Continental side of the North Sea). However, the recoveries of Cormorants in France and particularly Spain may indicate a true migration by some individuals. It is worth drawing attention to the fact that no Farne Islands Cormorant ringed since 1914 has been recovered in Spain and this is in marked contrast with the behaviour of Cormorants ringed at Mochrum in Wigtownshire (Stuart 1948), where 8% of the recoveries were from that country. Further, only nine (4%) of the Farne Islands Cormorant recoveries have been from France and Spain, whereas 35 (21%) of the Mochrum-ringed birds were from that area. This difference is significant ($P<.01$).

Thus, while these two Cormorant colonies are at about the same latitude, there is a marked difference in their behaviour. There is some evidence that this migratory behaviour was originally present in some of the Farne Islands population but has since been reduced or lost, while it has persisted in the Mochrum colony up to at least 1939. It is well established that populations within a species may vary in the presence or absence of migratory behaviour.

3. Recovery at Berwick-on-Tweed

Berwick-on-Tweed lies about 17 miles north-west of the Farne Islands and both Cormorants and Shags are shot in that area because of a reward scheme offered by the River Tweed Commissioners. Table 2 shows the records of birds ringed on the Farne Islands and recovered in the estuarine areas near Berwick-on-Tweed, and these indicate that there is a considerably higher proportion of Cormorants recovered in the Tweed region ($P<.001$).

TABLE 2—RECOVERIES OF CORMORANTS (*Phalacrocorax carbo*) AND SHAGS (*Ph. aristotelis*) AT BERWICK-ON-TWEED, NORTHUMBERLAND

	First-winter		First-summer		After first-summer	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Cormorant	49	33%	2	8%	19	33%
Shag	2	2%	0	0%	2	11%

TABLE 3—RECOVERIES OF CORMORANTS (*Phalacrocorax carbo*) AND SHAGS (*Ph. aristotelis*) INLAND

	First-winter		First-summer		After first-summer	
	No.	*Percentage*	*No.*	*Percentage*	*No.*	*Percentage*
Cormorant	26	18%	2	8%	7	12%
Shag	21	24%	0	0%	0	0%

4. Occurrence inland

The numbers of Cormorants and Shags recovered inland are shown in Table 3. There is no significance between the proportions of first-winter Cormorants and Shags recovered inland. There is, however, a marked difference in the inland areas involved. Of a total of 21 inland

FIG. 3. Recoveries during the first year of life of Shags (*Phalacrocorax aristotelis*) ringed on the Farne Islands, Northumberland. Symbols as in Fig. 1

FIG. 4. Recoveries after the first year of life of Shags (*Phalacrocorax aristotelis*) ringed on the Farne Islands, Northumberland. Symbols as in Fig. 1

recoveries of Shags, 20 were from south-east England (Fig. 3), but only eight out of 26 inland records of first-winter Cormorants were from this region. After the first winter, there are no records of Shags recovered inland, but there are nine recoveries of Cormorants.

The reason for the first-winter Shags being recovered inland predominantly in south-east England is not obvious. However, the recovery details of one individual in the Norfolk Broads may suggest a possible cause. This bird, 101.4477, repeatedly roosted on the roof of a bungalow before ultimately being found dead. It is possible that Shags have difficulty in finding suitable roosting sites on the low, flat coast-line of East Anglia. They usually roost on cliffs on rocky coasts and do not normally roost on the sea. Shags seeking places to roost in south-east England may have to choose sites which are washed by heavy seas (e.g. sand banks) and, should they be disturbed at night, they may inadvertently fly inland over the low coast-

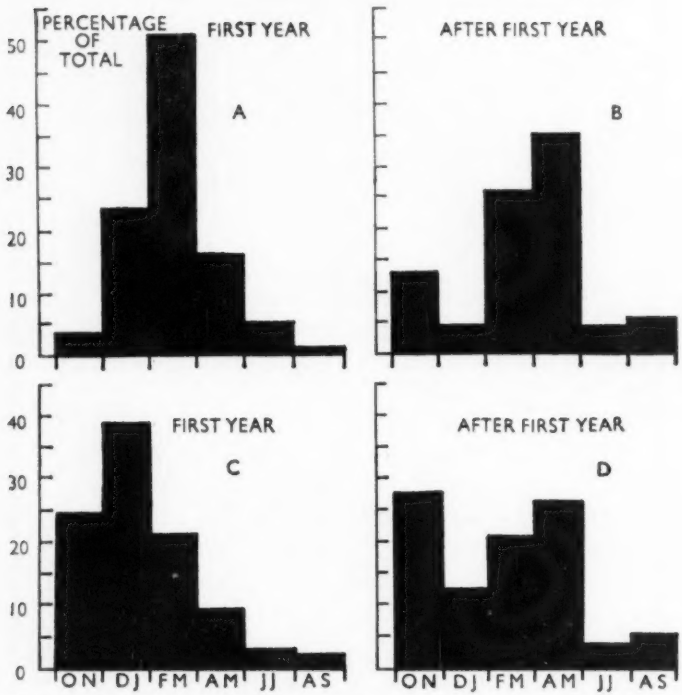

FIG. 5. The bi-monthly recoveries of Cormorants (*Phalacrocorax carbo*) and Shags (*Ph. aristotelis*) expressed as percentages of the total: (A) first-year Shags, (B) older Shags, (C) first-year Cormorants and (D) older Cormorants

line. Observations on the roosting habits of Shags in south-east England are required to test this hypothesis.

5. Seasonal variation in the time of recovery

The percentages of the total recoveries occurring in each month of the year are shown in Fig. 5. There is a marked difference in the time of the peak of mortality of first-winter Cormorants and Shags; the former reach a peak in December and January and the latter in February and March. This difference in the time of mortality is significant ($P<.01$). These peaks are not as pronounced in the older birds, but there is still a suggestion that mortality in the Cormorant tends to occur earlier than it does in the Shag.

DISCUSSION

From a study of both Passerine and non-Passerine birds, Lack (1944, 1945) described three types of distribution of pairs of closely related species (it is obvious from Lack's examples that he has regarded "closely related species" as synonymous with "members of the same genus"). These types are:

(1) where the geographical ranges of the two species do not overlap and in some instances their distribution is complementary over their combined ranges;

(2) where the two species exist in the same geographical area but differ in their habitats or food;

(3) where the two species exist in the same geographical area and the same habitat and utilise the same food.

Lack contended that the first two types supported Gause's hypothesis* and suggested that the third group contained examples which could probably be shown to belong to the second group if more ecological information were available.

Gause never published a generalisation of his laboratory studies and later workers have formulated definitions based on his work. Thus Lack (1945), in a paper dealing with the ecology of the Cormorant and Shag, defined Gause's hypothesis as ". . . two species with similar ecology cannot live in the same area. . . ." Gilbert *et al.* (1952) commented on this and other definitions used by Lack and stressed the need for the inclusion of the reservation that the two species must be in competition for a common requisite (such as food or breeding sites). While Lack failed to include this reservation in any of his definitions, it is clear from his writings that he fully appreciated the limitation of the hypothesis. Once the need for competition is included in the definition, Gause's hypothesis is both logically and mathematically sound; but unless the two species which have similar ecology are in competition, there is no reason why they should not permanently co-exist.

Both Lack (1945) and the present paper have presented data which show that there are a number of ecological differences between the Cormorant and Shag. Lack maintained that the differences which he described fully substantiated Gause's hypothesis, but this claim requires critical examination. It is possible to explain the differences in the ecology of two closely related species on the basis of competition and Gause's hypothesis, but this alone does not *prove* that the differences were actually the product of competition.

Most bird species have probably arisen by geographical rather than ecological isolation and since no two geographical areas are identical,

*Udvardy (1959) has shown that this concept was first put forward by Grinnell (1904) some 30 years before Gause published his experimental data.

it is conceivable that observed ecological differences between two closely related species arose as adaptations to the physical conditions of their respective ranges. Later, when one or the other species changed its range and they overlapped, it could be expected that the ecological differences would persist.

In the case of the Cormorant and Shag, it is necessary to take into consideration their taxonomic relationship. These two species have not evolved directly from a common parent stock; their common ancestor is probably much further removed. Therefore, there has been considerable time (in the evolutionary sense) for differences to have arisen by means other than competition. The importance of this point can be stressed by taking an example from another group of birds, say the genus *Larus*. It would be difficult to support a suggestion that the differences in the ecology (and even size) of the Herring Gull (*Larus argentatus*) and the Black-headed Gull (*L. ridibundus*) were the result of competition between the two species. Yet essentially this very suggestion has been made for the Shag and Cormorant.

Undoubtedly competition has been responsible for some of the differences which have occurred between closely related species of birds, but the extent of this influence has not been established. It is unlikely that two species could compete for more than one requisite at any one time. Thus competition is likely to alter only one ecological factor (and associated behaviour) at a time. For example, in the case of the Cormorant and Shag, they *may* have once been in competition for food, but it seems unlikely that they were in competition for nesting-sites at the same time. If these differences were produced by competition, they were probably in competition on two or more occasions. This limitation does not apply to ecological differences produced while the two species were geographically isolated, since more than one difference can be selected simultaneously by natural selection.

It has been the aim in this discussion to draw attention to the concept of Gause's hypothesis, and to suggest that at least one example which has been cited in support of the idea is perhaps not as convincing as it has been claimed.

ACKNOWLEDGEMENTS

I wish to thank Professor J. B. Cragg for helpful discussions during the preparation of this paper and also for reading the manuscript. I am also most grateful to Mrs. G. Hickling for making available the ringing recoveries of Shags and Cormorants ringed on the Farne Islands.

SUMMARY

An analysis of the ringing recoveries of 230 Cormorants (*Phalacrocorax carbo*) and 127 Shags (*Ph. aristotelis*) ringed on the Farne Islands, Northumberland, has shown

PLATE 35. Dark-phase Eleonora's Falcon (*Falco eleonorae*), Mogador, August 1959. This falcon is dimorphic, about one in four being dark. A few of these are black, but most are dark brown like this, with faintly streaked breast, barred undertail and no moustache (*cf.* plate 39c). The species is crepuscular; it is a summer visitor to islands between the Canaries and Cyprus, where it nests in autumn to feed its young on migrant birds (page 236) (*photo: Richard Vaughan*)

PLATE 36. Above, uninhabited islet off Ibiza, Balearics, July 1954, typical of the Mediterranean breeding sites of Eleonora's Falcon (*Falco eleonorae*). Inset, flight-silhouette, showing the long tail and wings (page 236). Below, three light birds: colonies are of two to 100 pairs (page 236) (*photos: Richard Vaughan*)

PLATE 37. Two dark/light pairs of Eleonora's Falcons (*Falco eleonorae*) at cliff nests, with Rock Doves (*Columba livia*) below, Mogador, August 1959. On the left a light female is brooding above her mate, while the other two have young in a nest on the sandy ledge between them (*cf.* plate 38) (*photo: Richard Vaughan*)

PLATE 38. Eleonora's Falcon (*Falco eleonorae*), Mogador, August 1959. Nests were scattered along the cliff top and on ledges below (*cf.* plate 37); left, a rock-sheltered nest on a slope; top and bottom, an open nest on flat ground. Two to four eggs are normal. Chicks seven days old (*top*) are surrounded by prey remains and feathers, but until the eggs hatch (*bottom*) the nest is clean; this female is raising her feathers to keep herself cool

PLATE 39 (*facing*). Upper, a light female (males are slighter, with smaller bills); note wings level with tail tip. Lower, dark and light compared; the latter is creamy-buff below with heavy black streaks and, Hobby-like, has rufous thighs and undertail (page 237 and *cf.* plate 35) (*photos: Richard Vaughan*)

PLATES 40 and 41. Redpolls (*Carduelis flammea*) feeding young (different nests), Inverness-shire, May 1959. The pair at the nest on the left showed all the characters of the Greenland race (*rostrata*), including large size, heavy bill and strongly marked flanks, while the nest itself was also unusual (pages 251-253). Above, typical British Lesser Redpoll (*disruptis*) and nest (*photos: S. C. Porter*)

PLATE 42A. Dead Sand Martin (*Riparia riparia*) trapped by hooked bracts of burdock heads, Northamptonshire, September 1960 (page 246) (*photo: F. A. Adams*)

PLATE 42B. Multiple nest of Great Tit (*Parus major*), Surrey, 1934; the cups correspond with side holes in the covering pot (page 247) (*photo: W. E. China*)

the following ecological differences between the two species and also between age groups:

(1) In both species, the young birds disperse further than the adults.

(2) The young Shags tend to move south of the Farne Islands in the winter and north of them in the summer; a reverse trend is found in the Cormorants, where there is a tendency to move north in the winter and south in the summer.

(3) There is no true migration of the Shags; a true migration may occur in some Cormorants, but this ability has apparently been lost by most of the Farne Islands population although it has been observed in a colony in Wigtownshire.

(4) Considerably more Cormorants than Shags are recovered at Berwick-on-Tweed, Northumberland, an estuarine area, where there is considerable shooting pressure.

(5) Both species occur inland during their first winter (but not subsequently in the case of the Shags); the inland recoveries of the Shags are almost exclusively from south-east England, while the Cormorants are more scattered.

(6) The peak of recovery of first-year Cormorants occurs before that of first-year Shags; there is a suggestion of the same difference in older birds.

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Studies of less familiar birds

III. Eleonora's Falcon

By Richard Vaughan

Photographs by Richard Vaughan and Oliver Carruthers

(Plates 35-39)

IT IS PERHAPS hardly surprising that Eleonora's Falcon (*Falco eleonorae*) was one of the last European birds to be discovered and described, and that it was not photographed successfully until these pictures were taken in 1959. The total world population is probably

rather less than 4,000 birds, and is sparsely distributed in the breeding season on uninhabited islets (plate 36a) and inaccessible cliffs (plate 37) between the eastern Canaries and Cyprus. Because of this, no doubt, knowledge of this bird has been limited and sometimes inaccurate. In the *Field Guide*, for instance, it is said to be "mainly resident", whereas in fact it is a summer visitor to its breeding range and has never been recorded in the winter months outside Madagascar and the Mascarenes; its cere, which varies between pale lemon and white, is said to be yellow; the one really diagnostic field character, the long tail, which is particularly noticeable in flight (plate 36a, inset), is not mentioned; and the statement that it feeds mainly on small birds is only known to be true of August, September and October, for insects certainly predominate in spring and early summer, and probably also in winter. These remarks are not made in a critical spirit, but simply to illustrate the inadequacy of our knowledge of this interesting species.

Eleonora's Falcon breeds in colonies (plates 36b and 37) varying in size from two pairs to a hundred or more. Apart from a concentration in the Aegean extending south to the north coast of Crete, where about half the total population breeds, the colonies are widely scattered: 800 miles separate those on the north-west African coast from their nearest neighbours in the Balearics, and the small colony on Lampione is more than 100 miles from any other. On the other hand, since the Rev. John White's "Hobbies" which bred in his time on the rock of Gibraltar were almost certainly Eleonora's Falcons, and since the species bred on the Îles d'Hyères in the seventeenth century, we may surmise that it was formerly more thickly distributed, at least in the Mediterranean.

Birds begin to arrive at their breeding colonies in the last week of April and may be seen there throughout the summer, though the two to four eggs are not laid before mid-July. No nest is made, and the eggs are deposited within about thirty yards of the sea, either in a crevice or on an open ledge on a cliff (plate 37); in the open on top of a cliff, within a yard of the edge (plate 38c); in vertical "pot-holes" on the tops of large boulders below cliffs; or on a steep cliff-slope, where they are usually partly sheltered by rock (plate 38b) or scrub.

The very late breeding-season of Eleonora's Falcon coincides almost exactly with the passage of autumn migrants through the breeding range, and the young falcons, which hatch from mid-August on and fly in the last week of September and early October, are fed almost exclusively on small Passerine migrants. This fact was strikingly illustrated at Mogador in 1959, where Mr. Oliver Carruthers and I identified the remains of some 250 individual birds killed by the falcons, for all save five of these were migrants. In August and September

Eleonora's Falcons kill far more birds than they actually need and "larders" are formed near the nests soon after the young have hatched; these are usually sited in a niche in the rock or under a bush and into them the bodies or remains of small birds are neatly stacked, tails outwards. Sometimes the corpses are untouched; sometimes they are decapitated or partly plucked; frequently only the hind parts with tail and legs attached are placed in the "larder". Prey remains are also found scattered about all over the breeding area. The utility of Eleonora's Falcon for the student of migration should not be scorned, for it not only provides material for the specific identification of such difficult warblers as *Hippolais* and *Phylloscopus,* but also kills species which one would not normally expect to see. Thus at one central Aegean colony my wife and I found the remains of a Little Crake (*Porzana parva*); and the evidence for the autumn migration of the Grasshopper Warbler (*Locustella naevia*) down the north-west African coast consists of seven corpses found by us at Mogador in 1959 and one recovered by Dr. H. B. Cott from an Eleonora's Falcon colony in the Canaries in 1931.

Eleonora's Falcon is dimorphic, about one in four individuals being of the very distinctive dark form (plate 35). The plumage of this form varies somewhat, but most individuals are dark brown, more or less uniform save on the breast, which is flecked or streaked with lighter brown (plate 39b). A few dark birds are uniform coal-black all over, while a few have the moustachial stripe faintly adumbrated and show some rufous on the thighs and under tail-coverts. The light form has dark brown or slate upper-parts, and the cream to buff breast is more or less heavily streaked with black (plate 39c). The lower belly, thighs, and under tail-coverts are rich rufous or chestnut. Often the upper breast is finely streaked, but the lower breast is invariably broadly streaked, and in general the under-parts are much darker than those of the Hobby (*F. subbuteo*), so that even light-phase individuals often look wholly dark from a distance, except for the white cheek. Intermediate forms are rare. The dark phase shows clearly in juvenile plumage. The average difference in wing-length of about a centimetre is insufficient to distinguish the sexes of Eleonora's Falcon in the field, but at close range the female's more powerful build, especially about the head and bill, is noticeable. Eleonora's Falcon is similar in size to, but more slender in build than, the Peregrine (*F. peregrinus*). The tips of its long wings and tail lie level when the bird is perched (plate 39a). It stoops like a Peregrine, hawks for insects like a Hobby, and even hovers like a Kestrel (*F. tinnunculus*) with tail outspread. Its usual call is a rather harsh *kya kya kya kya,* and this is excitedly repeated when a breeding colony is approached and the birds are put off their nests.

Eleonora's Falcon seems to be even more crepuscular than the Red-footed Falcon (*F. vespertinus*), and this is specially so in the breeding season, when Passerine migrants form the staple diet. One of the most characteristic sights at a breeding colony is the evening exodus of birds to their feeding areas, which may be at least six or seven miles away from the colony. During a fortnight's stay at the large colony off Mogador, we never saw a falcon carrying prey, yet on one occasion two Swifts (*Apus apus*) and two Nightingales (*Luscinia megarhynchos*) were brought in between 6.30 p.m. and 8.0 a.m. at a nest which we were observing during the daytime.

A word should perhaps be said in conclusion about the species most nearly related to Eleonora's Falcon, the Hobby and Sooty Falcon (*F. concolor*). The plumage of the Hobby is similar to that of the light phase of Eleonora's Falcon; like Eleonora's it is a summer visitor, and it breeds late, though not so late as Eleonora's. The Sooty Falcon is much nearer Eleonora's. It breeds colonially at the same time of year on islets in the Red Sea, and its habits appear to be very similar. Its plumage is interesting, for both sexes are a uniform ash grey all over, and a dark phase occurs, but the young (at any rate of the light phase) have the light, streaked under-parts and moustachial stripe of young Hobbies, Peregrines and light-phase Eleonora's Falcons, a plumage pattern which perhaps approximates to that of the common ancestor of all these species.

A much fuller account of the characters, habits, food, breeding, distribution, numbers and migration of Eleonora's Falcon will be found in *Ibis*, 103a: 114-128.

The taxonomy of the redpolls

By Kenneth Williamson

Migration Research Officer, B.T.O.

CURRENTLY MOST TAXONOMISTS divide the redpolls into two species, the high-arctic *Carduelis hornemanni* and the low-arctic, subarctic and temperate zone *C. flammea*. The correctness of this treatment is a matter for disputation (Salomonsen 1928), and in many respects it would be more satisfactory to regard the whole group as conspecific.

There are two high-arctic forms, the large and extremely pale *hornemanni* inhabiting the more northern fell-slopes of Greenland on both the east and west coasts (and for the most part wintering in that country); and the smaller but otherwise very similar Hoary or Coues's Redpoll, *exilipes*, with a Holarctic distribution across northern Canada, Alaska, Siberia and northern Russia to Lapland. The other group

contains the Mealy Redpoll, *flammea,* with a Holarctic distribution south of the range of *exilipes*; the Lesser Redpolls with a disjunct distribution in the mountains of south-central Europe (*cabaret*) and the British Isles (*disruptis*); the low-arctic Greenland or Greater Redpoll, *rostrata,* in southern Greenland and Baffin Island; and an interesting sub-arctic form *islandica* in Iceland, about which more is said below. In northern Norway the population is neither true *flammea* nor true *exilipes,* but shows characters linking the two (Payn 1947); this has been named *pallescens* and is sometimes put with the high-arctic and sometimes with the other "species". Descriptions of Hornemann's, Coues's, Mealy, Greenland and British Lesser Redpolls can be found in *The Handbook* (I: 66-74) and it is not proposed to repeat them here.

When the several groups are examined in series in the museum, taking birds of the same age and season, there are seen to be slight but fairly constant differences between the Old and New World populations. Thus, American Mealies tend to be darker on the mantle and more prominently streaked on the flanks than European, and indeed these characters find their strongest expression in the low-arctic Greenland population *rostrata,* which also has a heavier and more bulging bill. There can be little doubt that this redpoll has invaded southern Greenland from the west. The American Hoary or Coues's Redpolls tend to have warmer buff fringes on the upper-parts than Eurasian *exilipes* in fresh autumn dress, though the two are inseparable in spring; they are, moreover, more consistently immaculate in the whiteness of the rump.

A further important point is that whilst Mealy and Hoary Redpolls occur in some parts of arctic America as a mixed population, there is apparently no evidence of interbreeding and the indications are that they behave as good species; but in parts of Eurasia in addition to N. Norway there is clearly some intergradation between the two, so that their relationship seems to be more that of conjunct subspecies. This fact was already clear to Dresser (1871-81), who had difficulty in assigning birds collected on the Pechora by Seebohm and Harvie-Brown to either *flammea* or *exilipes,* "for they resemble the latter in form and measurements, but have the rump more or less striped and not white". There are a number of specimens from redpoll invasion-years (especially 1910) in the British and Royal Scottish Museums, from Fair Isle south to Norfolk, which one cannot place with confidence in either "species", and for which *pallescens* exists as a convenient niche (some, examined by the late Dr. C. B. Ticehurst, have the despairing note "bastard *linaria* × *exilipes*" scrawled on the labels!). Similarly, there are birds from wintering areas in the U.S.S.R. (Pskov, Moscow, Krasnoyarsk) which have mantles similar to Mealy or a little paler, but show the clear white rumps of the *pallescens* type. When in

Lapland in March 1938, Col. R. Meinertzhagen collected a series from localities about 180 miles north of the Arctic Circle; his view that they are better called *pallescens* than *exilipes* is understandable when one compares them with topo-typical *exilipes* from arctic America.

This *pallescens* type is not the only evidence of apparent hybridisation. As pointed out by Salomonsen (1928, 1951), the Icelandic population has all the appearances of a "hybrid swarm". I have notes made some years ago on about twenty Iceland Redpolls kindly lent to me by Dr. Salomonsen from the Universitetets Zoologiske Museum, Copenhagen; these birds, taken in two localities, Sydra-Mylasysla and Sydru-Thingeyars´sla, in the second half of September 1906, run the gamut of variation from near-*rostrata* to near-*hornemanni,* the latter having "creamy-white streaking on mantle very pronounced" and the rumps either immaculate or "with very faint streaks", with in one or two cases the white extending on to the lower back. Bird (1935), noting the paleness of many Icelandic birds, suspected that these were winter immigrants of *exilipes* from Europe. True *hornemanni* very rarely visits Iceland.

In so far as one can generalise about *islandica,* it is usually similar above to the Mealy Redpoll, being a brighter and warmer brown with paler fringes than *rostrata,* with the rump whiter than in that form, but it tends towards *rostrata* in its more pronounced flank-streaking and the heavier bill.

Possibly *hornemanni* was the breeding form in Iceland in an earlier, colder epoch, and with an amelioration of climate the low-arctic form (which is strongly migratory) colonised Iceland from the south-west faster than *hornemanni* could withdraw, a variable hybrid population resulting. A reflection of this is to be seen today in the situation engendered by the recent climatic improvement in west Greenland. Salomonsen (1951) gives evidence that up to the end of the last century Hornemann's Redpoll was the breeding bird of Umanaq and Upernavik Districts where *rostrata* was unknown; he visited Upernavik in 1936, finding *rostrata* abundant and *hornemanni* reduced to a very local bird. He records how interbreeding was taking place at a mixed colony at Orpik, a pair collected *in cop.* proving to be ♂ *rostrata* and ♀ *hornemanni.* He adds, "I failed to find any difference between the two forms in general behaviour, song and other notes". Wynne-Edwards (1952) reached the same conclusion with regard to a mixed population at Clyde Inlet, Baffin Island, where the only isolating mechanism appeared to be the later arrival of *rostrata* a fortnight after mating was first witnessed in the high-arctic form.

With regard to the recent breeding of a north-western type of redpoll in Scotland (pages 251-253 and plate 40), it can be said that the photographs taken at the nest, and the description of the birds, rule out the

possibility of their being typical *islandica* or individuals of that population verging towards the *hornemanni* type. Only a small minority of Iceland Redpolls are so dark on mantle and rump as to be virtually inseparable from the Greenland *rostrata*. Moreover, *islandica* is almost a sedentary form (which is what one would expect if the original stock was of *hornemanni* type) and, although I have examined many immigrant redpolls from the Outer and Inner Hebrides, Mull, Argyll and Fair Isle in various collections, only two came close to the paler specimens of *islandica* and were possibly that race, while a few others were indeterminate. The great majority (including those referred to *islandica* by Ticehurst 1924), are quite characteristic of *rostrata*, and it is this form which, in addition to wintering in Iceland, enters north and west Scotland as an autumn migrant, in some years in considerable numbers (Williamson 1956, Davis 1960). Thus, whilst there cannot be absolute certainty, there is extremely high probability that the Scottish breeding pair belonged to the Greenland low-arctic form.

So far as the problem of speciation is concerned, one must conclude that, as pointed out by Wynne-Edwards (1952), the two groups of redpolls are sympatric over a wide area of North America and do not apparently interbreed. In parts of Europe, however, climatic factors have apparently intervened to break down the barrier to interbreeding. Over much of Europe and Asia this may affect only individuals, perhaps more particularly in late arctic springs when *exilipes* is forced to breed farther south than usual; but in Iceland certainly, and north Norway probably, the isolating factor has broken down at the population level, so that in Europe the two groups are at best only subspecifically distinct.

My thanks are due to Dr. Finn Salomonsen for reading through the paper in draft.

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Notes

Manx Shearwater nestling still unfledged in late November.—On 28th November 1960 Mr. W. Evans, a farmer on Bardsey Island, Caernarvonshire, discovered a young Manx Shearwater (*Procellaria puffinus*) in one of his fields where many of these birds had nested earlier in the year. It was in the afternoon that he picked it up and examined it, and he described it to me the same evening. It was unable to fly and still downy, although the feathers were growing well. It was apparently in good condition and did not seem to be injured in any way or undernourished. As there was a chance that the adults might still be flighting in to feed it, I spent some time in the field concerned later that night. However, I did not hear the calls of any Manx Shearwaters and a thorough search the following day failed to reveal the chick. Nevertheless, although I did not see any shearwaters off Bardsey during my visit from 19th November until 1st December, I have no reason to doubt Mr. Evans's word since he has lived there for many years with the birds breeding in large numbers.

The Handbook states that in the British Isles the Manx Shearwater lays between early May and the first half of June. The egg from which this late November youngster came must have been laid about the first week of August. IAN M. WALKER

[We have discussed this record with several other observers who know Mr. Evans and the circumstances of his discovery. These people include R. W. Arthur, warden of the bird observatory on Bardsey in 1960, and Mrs. J. B. Cowdy. All support the record. We also asked Peter Davis to comment in view of his great experience of Manx Shearwaters on Skokholm, Pembrokeshire, during 1954-56. He wrote, "I was never on Skokholm after 1st November (except for odd day trips), but we were quite often out at night until the end of October. We never saw a young shearwater after about 15th October and any that month generally looked rather retarded and dejected. As to the adults, we seldom noted them, even out at sea, after the first week of October. The work of Pauline Ralphs (*Skokholm Bird Observatory Report for 1955*, pp. 20-22) confirmed the desertion of chicks before they are fledged, but her longest desertion period was only eighteen days and that was something of an exception since the next longest was thirteen. Some late chicks may perhaps be deserted rather longer than this, judging by their weak condition when they finally emerge, but if the one on Bardsey was in even reasonably good shape it must have been fed until almost mid-November. Incidentally, I have no evidence that Manx Shearwaters ever lay replacements, and

so it seems unlikely that a lost egg or chick could have been the cause of a laying as late as August."—EDS.]

Kestrel taking Kentish Plover.—Recently (*Brit. Birds*, 53: 573) a female Kestrel (*Falco tinnunculus*) was recorded taking a Turnstone (*Arenaria interpres*). On 7th June 1952, R. W. Crowe and I saw a male Kestrel capture an adult Kentish Plover (*Charadrius alexandrinus*) which was feeding on the shore of the Slufter, on Texel in the Netherlands. Our attention was drawn by the sudden, vociferous alarm-notes of Redshanks (*Tringa totanus*). The Kestrel rose with considerable difficulty, the struggling plover in its talons, and slowly made off to a point in the sand dunes about half a mile away, where it was lost to view.

K. E. L. SIMMONS

Great Black-backed Gull attacking Coot.—In the winter of 1957 I saw a flock of sixty or seventy Coots (*Fulica atra*) disturbed by a boat at Abberton Reservoir, Essex. They flew upwind in scattered formation at a height of thirty-five or forty feet and then, approaching a causeway, turned downwind to head back to open water. Just as they turned, a Great Black-backed Gull (*Larus marinus*) came downwind over the causeway, some ten or fifteen feet higher in the air than they were. In a very creditable "stoop", the gull went straight through the flying Coots and seized one by the neck in full flight with the greatest of ease. An aerial struggle took place, the Coot kicking and flapping with all its might. The gull stalled and was forced to drop its victim about thirty feet into the water, but it dived after it at once. The Coot was still full of fight and, when the gull hovered overhead, it jumped up out of the water at its attacker; when the latter settled on the water two or three feet away, the victim adopted the well-known hostile attitude with wings raised and neck stretched out. This went on for about five minutes, but all the time the Coot was edging back to the reassembled flock, until finally it made a sudden quick rush and attained safety in the dense pack. The gull then flew off.

R. V. A. MARSHALL

Lesser Black-backed Gulls day-roosting for long periods in trees. For many years small parties of adult Lesser Black-backed Gulls (*Larus fuscus*)—presumably non-breeding birds—have been present at Saltford, Somerset, during the summer months. Since 1959 I have noticed up to four day-roosting for long periods on an ash and two oaks which are to be seen from my garden. They use both vertical and horizontal perches—dead boughs protruding from otherwise leafy trees—approximately twenty-five feet above the ground. The vertical perches are three to five inches thick and the gulls make use of

convenient clefts or notches; some of the horizontal perches are also only a few inches thick. If undisturbed, the birds are content to remain on the same perches for much of the day and I have timed individuals for up to six hours. A number of other trees in the vicinity, including other ashes and oaks, seem to possess suitable roosting places, but so far only the three trees have been used.

J. A. G. Barnes and W. G. Teagle reported isolated records of single Lesser Black-backed Gulls roosting in trees (*Brit. Birds,* 41: 126; 42: 64), and I have once seen an adult perched on a nine-inch thick horizontal bough on a Scots pine at Chew Valley Reservoir, Somerset, where a colony of thirty to fifty pairs of these birds now breed, but I can trace no other observations of daily roosting in trees as happens at Saltford.

BERNARD KING

Unusual nest-sites of Herring Gulls in Cornwall, including a tree and various buildings.—On 16th June 1959 I visited the grounds of Porthpean House, near St. Austell, Cornwall, through the kindness of Lt. Col. G. Petherick, and saw a Herring Gull (*Larus argentatus*) sitting on a nest in the fork of a large Scots pine (*Pinus sylvestris*). The tree was about fifteen yards from the coast, and the nest, which so far as could be seen was made of grass, was about thirty feet above the ground. Col. Petherick told me that the birds had been sitting for some weeks, and that a similar nest had been built in 1958. Unfortunately, both attempts proved abortive. This is the first record known to me of this species breeding in a tree, and it is of interest in connection with the record of a Lesser Black-backed Gull (*L. fuscus*) nesting on a thorn bush (*Brit. Birds,* 52: 60).

It may be appropriate to record here that, in addition to the nesting of Herring Gulls in inland china-clay pits in Cornwall (*Brit. Birds,* 41: 277; 43: 94), since when four other clay pits have been colonised, I have records of this species breeding on houses in eleven Cornish towns or villages. These are (listed anti-clockwise round the coast):

Port Isaac (1910)
Porth (near Newquay) (1943)
Newquay (1920s onwards)
St. Ives (1952 onwards)
Porthleven (1951 onwards)
Portloe (1958)
Mevagissey (1946 onwards)
St. Austell (1958 onwards)
Polruan (about 1950 and again 1958-59)
Polperro (before 1958)
Par (1959)

All of these towns except one are coastal, the exception being St. Austell which lies about three miles inland; there a pair of Herring Gulls has nested on the chimney of the same house for three successive years. In two of the towns the species breeds on houses in considerable numbers, and in one case the roof of a bungalow in course of construction was used. In 1959 a pair nested on the flat wall of a

"tank" at the rear of a china-clay drying factory at Par. In 1958 a pair attempted to do so on the roof of a railway coach at Newquay, and what was presumably the same pair built an unsuccessful nest on a hand-crane at the same place in 1959. On 19th May 1960 I climbed to another nest, probably again of the same pair, on the roof of another railway coach. One egg was subsequently laid, but the coach was moved during shunting operations, whereupon the gulls made a second nest on the railway platform, but this was also disturbed and the one egg laid was taken.

I have two records of breeding in gardens. One pair, in 1955, nested in a flower bed at Polruan, and on 2nd June 1959 a pair was found incubating eggs about seven feet from the windows of a hotel near Mullion (*29th Report Cornwall Bird Watching & Preservation Society, 1959:* 32). Nesting on beaches has been recorded in three localities in Cornwall.

These records seem of interest in connection with similar tendencies on the part of Herring Gulls in other parts of Britain, and also on the Continent, to colonise buildings and other unexpected sites.

C. J. STEVENS

Skylarks and Meadow Pipits eating bread.—At the beginning of 1959 I bought a bungalow on the cliff top overlooking Widemouth Bay, Cornwall. It is 200 feet above the sea in a windswept and treeless area. Acres of cornfields stretch inland from my lawns. From the first I put out bread for the birds on a bird-table, and on the surrounding lawn, not far from my windows. Blackbirds (*Turdus merula*) and Song Thrushes (*T. philomelos*) and also Herring Gulls (*Larus argentatus*) and Rooks (*Corvus frugilegus*) were soon regularly coming to feed. It was in early July 1960 that I was first surprised to notice a single Meadow Pipit (*Anthus pratensis*) eating the brown bread which I was giving the other birds. This it continued to do fairly regularly for two or three weeks and on the morning of 23rd July it brought with it a young bird which it proceeded also to feed on the bread. This was repeated on the next two days, but then it was not until mid-October 1960 that I again saw a Meadow Pipit taking bread. After that, one was rarely far from my garden throughout the winter and fed regularly until early March 1961.

At about the same time as the original Meadow Pipit appeared, in early July 1960, one of a pair of Skylarks (*Alauda arvensis*), which had a nest in the adjoining cornfield, also started to eat bread on the lawn. Subsequently both birds took bread to their four week-old young in the nest and they continued to feed them on it after they had fledged.

I can find no previous record of either Skylarks or Meadow Pipits feeding regularly on bread in this way. FLORENCE E. CARTER

Sand Martin killed by burdock.—On 9th September 1960, at Ecton sewage-farm, Northamptonshire, I found a juvenile Sand Martin (*Riparia riparia*), a day or two dead, firmly trapped by the hooked bracts on a thick bunch of burdock heads (*Arctium*). Its position seemed to suggest that it had perched on the burdock and had then become ensnared by the hooks catching in the feathers of its breast. It had apparently struggled and flapped to escape, with the result that its left wing was also impaled. I picked the burdock concerned, with the bird still on it, and it was later photographed by Mr. F. A. Adams against a stucco wall background. The photograph now reproduced (plate 42a) shows clearly the numerous hooks which were sticking up through the webs of the primaries and secondaries of the left wing.

M. GOODMAN

[A previous note by Miss W. U. Flower (*Brit. Birds,* 51: 276) described how a migrant Goldcrest (*Regulus regulus*) became entangled by a burdock on the Isle of May. In that case it was the bird's soft ventral feathers which were caught, and it was thought that it could not have freed itself without assistance. Another fatal casualty was reported in *The Field* in 1950 (196: 833) by W. V. Crich. This concerned a Ruby-crowned Kinglet (*R. calendula*) in Ontario, Canada, and was illustrated by a photograph. Similarly B. Vida (*Aquila,* 55-58: 295) recorded a Hungarian instance of a Long-tailed Tit (*Aegithalos caudatus*) which died through being caught in thistles. Such accidents are probably not so uncommon, therefore. Perhaps the most spectacular case of birds being caught on plants was described by J. Dorst (*Ibis,* 99: 594-599). He wrote, with regard to the Puya stands of the Peruvian high plateaux, "... we encountered as many as ten corpses spiked on one Puya. There is almost no Puya without mummified bodies of birds that could not escape. The doves are the chief victims. But the number of passerine birds is nearly as high. We discovered corpses belonging to every species that live in the Puyas, except humming-birds ...".—EDS.]

Rooks and Desert Wheatear feeding on sandhoppers.—Several Passerine species have been recorded feeding on sandhoppers (*Talitrus locustra*). These have included Meadow Pipit (*Anthus pratensis*), Swallow (*Hirundo rustica*), Sand Martin (*Riparia riparia*) and Song Thrush (*Turdus philomelos*) (*Brit. Birds,* 45: 76; 49: 502-503; and 53: 224-225). In fact, I think that the habit must be quite widespread among Passerines (and various waders regularly feed on sandhoppers). For example, on 15th June 1950 two of a party of five Rooks (*Corvus frugilegus*) I saw on the shore at Instow, Devon, were feeding on sandhoppers in the tide-wrack. Similarly, on 15th November 1958, at Little Aden, I saw a male Desert Wheatear (*Oenanthe deserti*) and a

Blackstart (*Cercomela melanura*) feeding voraciously on these crustaceans on the shore. BRYAN L. SAGE

An interesting case of multiple nesting by Great Tits.—The Bird Section of the British Museum (Natural History) recently received from Dr. W. E. China, lately Keeper of Entomology, two photographs of an interesting multiple nest of the Great Tit (*Parus major*), taken in his garden at Westcott, Surrey, in 1934. One of these is reproduced on plate 42b. The birds had completely covered the ground under an inverted flower-pot (which was roughly twelve inches in diameter) with a mass of the usual materials, but, instead of the normal cup at one side, there were three nests, equally spaced round the edge. In addition to the standard drainage hole (through which the birds entered), the flower-pot had three smaller holes symmetrically arranged around its base. Plate 42b shows clearly how the positions of the three nests corresponded with the positions of these smaller holes. It appears that the bird recognised the nest by its position relative to the smaller hole. The nests held five eggs, four eggs and one egg respectively, the total being a normal clutch for this species. All nests were ultimately deserted and no eggs hatched.

Laterally-arranged multiple nests, placed in a series of identical compartments formed by a beam with rafters, a ladder, stacked pipes, or spaces left in a brick wall, have been recorded for a number of species (see especially Hemmingsen 1956); but I have found reference to only one other radially-arranged example, which was also in Surrey. This was a nest of the Blue Tit (*P. caeruleus*) under an inverted earthenware bowl which appears from photographs to have been about a foot or fifteen inches in diameter (Reynolds 1944). The birds entered through a drainage hole in the base, and five complete and two partial nest cups were arranged in a circle occupying most of the area under the bowl. There were two eggs in one nest and one in each of three others. It is not possible to tell from the published photograph whether additional drainage holes were present in the base of the bowl.

C. J. O. HARRISON

[It would appear that, after entering the central hole, the birds were disoriented by the symmetrical pattern of light entering through the three exactly similar smaller holes. In sunny conditions the shafts of light would vary according to the time of day and this may possibly have added to the birds' confusion.—EDS.]

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Lesser Whitethroat feeding on suet.—On several occasions on 13th and 14th August 1960 I watched a Lesser Whitethroat (*Sylvia curruca*) feeding on a block of suet fixed under the flat top of a bird table, on the open lawn in my garden at Lightwater, Surrey. It went to the suet so confidently that it seemed likely that this was not the first occasion it had done so. Each time it perched on top of the suet and pecked vigorously until displaced by Great Spotted Woodpeckers (*Dendrocopos major*) or tits. This bird must have been a passage migrant, since the species is not a summer resident in the vicinity.

R. W. HAYMAN

Blackbird population imitating human whistle.—My parents have lived in our present house at Colchester, Essex, since 1913. I can remember back to about 1924, and during all this time my mother has been in the habit of using, fairly often, a particular four-note whistle as a means of calling other members of the family, various pets and the chickens. During the summer of 1949 I was home only occasionally at week-ends, but I noticed that a Blackbird (*Turdus merula*) was imitating this whistle perfectly and had incorporated it into its song. Its favourite song post was in a plum tree about ten yards from the pantry window, out of which my mother often used to make this whistle. She also had to pass close by this tree every time she went down the garden, so the bird had plenty of opportunity to hear the sound. In every succeeding year up to and including 1961, a total of thirteen seasons, one or several Blackbirds over a radius of about a quarter of a mile have used the same distinctive phrase in their songs. As not all of them sing it as often as others, it is very difficult to be sure of the exact number, but I get the impression that it has never been used by less than two individuals, or by more than five or six.

Sometimes the whistle is uttered singly, but more often it is tacked on to one of the bird's own song phrases. Sometimes it is repeated twice, and occasionally one or other of the Blackbirds has made a simple variation by repeating the last two notes. I can never remember, however, hearing one prefacing any of its own song phrases with the whistle. It is always the other way about. I also once heard it given in a sub-song at a roost in February. One year in June a Blackbird sang almost continually in a very small area for two or three days (I thought at the time that it might have lost its mate or been driven from its original territory) and during this period I never heard it sing anything else but this one whistle—so much so that I began to wish heartily that it had never learnt it.

I find that a Blackbird which is already able to imitate the whistle can often be induced to perform if I whistle first. Within a minute or so it will always answer back. It has been suggested that the birds

have thus been taught afresh each year, but I do not think this can be so, having had experience of the immense amount of repetition which is needed to teach even such a gifted mimic as an African Grey Parrot (*Psittacus erithacus*) to imitate something to order. I think that several Blackbirds learnt from the original mimic, and that by whistling to them I only "jog their memories". It seems interesting that this song phrase should have persisted so long, and I wonder whether bird song may not sometimes evolve by such means.

Our cat has heard this whistle from Blackbirds all his ten years of life, and our dog for twelve out of his fourteen years, but although it is a most excellent and true imitation, both in pitch and tempo, I have never seen either of them taken in by it.

R. V. A. MARSHALL

Rock Pipit using its feet to disturb prey in sand.—On 19th March 1961, at the mouth of the Nevern estuary near Newport, Pembrokeshire, I saw a Rock Pipit (*Anthus spinoletta*) fly from some dunes to the shore and forage on the sand, which was damp from seepage. It walked with short steps and frequently stood moving its feet with a shuffling motion; it also scraped both feet flat on the ground without raising them. Once it pivoted from side to side, turning on its feet. These actions seemed to be effective in revealing prey since it often pecked at the ground, not at its feet but a little way ahead. I could find nothing to suggest what the prey might be, but it is unlikely to have been marine worms as the bird was foraging very near to the edge of the dunes. The foot movements evidently caused small invertebrates to move and show themselves, and were not directly instrumental in uncovering them. I eventually lost sight of the bird and about ten minutes later it was perched on a jetsam branch, whence it flew back to the dunes.

T. A. W. DAVIS

Lesser Grey Shrike impaling prey on thorns.—In the last paragraph of his recent article on the Lesser Grey Shrike (*Lanius minor*) (*Brit. Birds*, 53: 397-402), I. J. Ferguson-Lees says that this species "does not appear to indulge in the shrike habit of impaling prey in 'larders' ". When he wrote this he was unaware of the following incident.

In June 1960, on the Black Sea coast of Bulgaria between Balcik and Varna, I was watching a Lesser Grey Shrike collecting food for its nestlings. It dropped down from a wire, seized an object from the ground in its bill, and then flew with it to some brushwood near-by. Watching from cover through binoculars, at a range of about 30 yards, I saw the shrike impale the object on a pear thorn and fly away. On investigation this proved to be a Mole Cricket (*Gryllotalpa*), which was still alive although impaled through the upper abdomen. On other

spikes were some dried insect remains which I could not identify, and these could also have been placed there by this bird. The nest was about 60 yards away. J. STAFFORD

Myrtle Warbler in Devon.—An immature Myrtle Warbler (*Dendroica coronata*) was identified on Lundy, Devon, on 5th November 1960 and it remained on the island until the 14th. It was first seen at 11.0 a.m. on the 5th in Millcombe gardens. Attention was attracted to it by its bright yellow rump, which was visible in flight. Excellent views were then obtained, at distances down to four yards, as the bird fed on the ground and from an ivy-covered wall where it caught flies in a very flycatcher-like manner. It was slightly smaller than a Blackcap (*Sylvia atricapilla*) near-by, but its general shape was more that of a flycatcher than a warbler. Its bill was black and flycatcher-like. Its head appeared at first to be uniform brown with a slightly paler and more greyish superciliary and a pale ring around the dark eye, but closer observation from above revealed a slight yellow patch on the crown. The mantle and back were greyish brown, streaked with darker brown, especially on the "shoulders". The rump was brilliant lemon yellow and this contrasted sharply with the tail, which was black except for white patches towards the ends of the outer feathers (these last showed only in flight). Later, the upper tail-coverts were seen to be striped black and grey. The wings were almost black, with two whitish bars across each, except that pale edges to the primaries gave them a slightly streaked appearance when closed. Chin and throat were whitish, and the breast a light greyish-buff with dark streaking on the sides and a slight yellow patch in each "armpit" (more prominent on one side than the other). The flanks were pale greyish-buff with dark streaks. Legs and feet were black.

Frequent attempts were made to catch the bird in mist-nets, but it was not until 11.30 a.m. on the 8th that it was eventually trapped and ringed. During the intervening period it had frequently been heard to utter a loud *chick,* both in flight and while feeding. The following detailed description was taken of the bird in the hand:

Upper-parts. Forehead grey-brown with dark brown central streaks to feathers; central crown bright lemon yellow, obscured by large brown fringes and tips; nape brown, some feathers with black shaft streaks. Superciliary slight and pale whitish-buff; orbital ring with white areas at top and bottom; lores black with buff-brown tips; ear-coverts pale brown. Mantle brown, upper feathers fringed grey, all with dark centres; back black with wide brownish-grey fringes; rump bright lemon yellow; upper tail-coverts black with broad pale grey fringes. *Tail* mainly black-brown; outer feathers with slight white fringes on outside edges, others with grey fringes on outer webs; central pair also fringed white on inner webs; outer two on each side with a white patch on the distal part of the inner web, these patches being largest on the outermost.

Wings: primaries and secondaries dark brown with pale greyish fringes on outer webs and white fringes on inner webs; primary coverts dark brown with slightly paler fringes; greater coverts black-brown with pale brownish-white fringes on outer webs, and buffish-white tips forming a white wing-bar; medium coverts black with broad white tips forming a second wing-bar and outer webs slightly fringed whitish; lesser coverts black-brown with broad grey fringes on both webs, washed brownish towards the tips. *Under-parts.* Chin white, washed buffish-brown; throat pale whitish-buff, fringes washed brownish. Breast feathers dark brown, broadly fringed whitish-buff; those on sides of breast with more pronounced black centres; feathers immediately under the wings fringed bright yellow, forming a distinct yellow patch on each side; flank feathers black-brown with broad buffish-white fringes, giving a streaked appearance. Belly white, washed pale yellowish-buff; under tail-coverts white, proximal ones with a slight buffish wash. Under wing-coverts brownish-grey with greyish-white fringes, those under the bastard wing being black-brown with slight pale greyish-white fringes. *Soft parts:* bill black; legs and feet black, soles blackish-brown; iris very dark brown. *Measurements:* wing 72.5 mm. (73.5 mm. straightened), tarsus 21 mm., weight at capture 11.9 gm. *Wing formula:* 4th primary longest, 2nd 2.5 mm. shorter, 3rd 1.0 mm. shorter, 5th 2.0 mm. shorter, 6th 6.0 mm. shorter, 7th 9.0 mm. shorter, 1st minute and hidden (6 mm. shorter than coverts); 3rd, 4th and 5th emarginated on outer webs. Feathers of wings and tail abraded at tips.

The bird was photographed in colour, ringed (87300) and released at 2.0 p.m. As already stated, it remained on the island for a further six days. Apart from the writer, a number of other observers watched it. Those who saw it in the hand included F. W. Gade, F. G. Lyall, J. Ogilvie, M. and V. Squire, and A. W. Strick.

This is only the second record of this American species in Britain and Europe, the first also having been in Devon, at Newton St. Cyres, near Exeter, in January and February 1955 (*Brit. Birds,* 48: 204-207 and plates 25-28). However, it should be remembered that there are at least two records of Myrtle Warblers crossing the Atlantic on board ship to within sight of the coast of Ireland or Britain (*Brit. Birds,* 52: 237-238).

W. B. WORKMAN

Greenland-type Redpolls nesting in Inverness-shire.—While photographing in the Spey Valley, Inverness-shire, in 1959, we were shown the nest of a Redpoll (*Carduelis flammea*) by a local gamekeeper. The keeper, a very experienced nest finder and well acquainted with all the local birds, stated that the adults were "not ordinary Redpolls" (which he knows very well). He claimed that they were larger and had a very pronounced double white wing-bar which even in flight distinguished them from the usual ones breeding there.

This pair had already been shown to Mr. and Mrs. W. Cairns who were also photographing in the area and they had made a colour film at the nest. As the birds were therefore used to a hide, we erected a small pylon on the evening of 23rd May. The nest, which contained

five large young nearly ready to fly, was itself not typical of that of a Lesser Redpoll (*C. f. disruptis* and *cabaret*), with which we are both familiar. The nest of the British race, *disruptis,* is often characterised by a flat platform of sticks supporting a shallow cup-shaped structure. The whole is thus rather flat in appearance, and roughly and untidily built of relatively coarse twigs. This nest was larger and deeper than is usual for *disruptis,* and it tapered to a rough point where it fitted into the crutch of a juniper bush, five feet from the ground. It was built of juniper twigs, heather bents and grass stems and lined in typical Redpoll manner with hair and feathers. The locality was a small oasis of about two acres of juniper scrub at a point where the grazing meadows of a farm gave way to the rough pasture of higher moorland, and several pairs of Lesser Redpolls were also breeding.

Our hide was occupied on 24th May from around mid-day until 2015 hours. Good views were obtained of both adults from a distance of four feet as they fed their young. They were similar, except that the male was brighter. Their general appearance was that of large and coarse Lesser Redpolls. Particularly noticeable was the heaviness of the bill, which appeared both broader and deeper than in a typical Lesser Redpoll. The under-parts were greyish-white, with few markings except on the flanks which were boldly patterned with heavy streaks. These were much more noticeable than the streaks on the flanks of *disruptis* and the difference might be compared with the difference between the breast spots of Song and Mistle Thrushes (*Turdus philomelos* and *viscivorus*). The crimson on the forehead seemed paler than in *disruptis* and there was no pink on the breast. The upper-parts had the usual grey-brown, streaked appearance of a Lesser Redpoll and did not appear any darker, but the greyish white wing-bars seemed more prominent. Some check as to size was obtained in the following way. The birds were photographed from a known distance, with the aid of high speed flash and a lens of eight-inch focal length. The size of image produced by a lens is a function of the distance of the object, its size and the focal length of the lens. It was possible to set up the camera again with an eight-inch lens and to determine what length an object had to be to produce a similar-sized image to the one already obtained. A further check was made from the photographs, using such known measurements as the diameter of the nest and the distances between certain branches as a means of estimating the size of the bird. Allowing for the fact that absolute side views were not obtained, this was nearly six inches. Thus in size, as well as in appearance, these birds seemed to agree well with the Greenland race (*C. f. rostrata*), though it must be borne in mind that a minority of Iceland Redpolls (*C. f. islandicus*) are hardly separable from this form. Confirmation was later obtained by an examination of skins of the various races of

Carduelis flammea at the British Museum (Natural History). The fact that the two birds of the pair were very nearly alike seems to militate against any suggestion of their being aberrant Lesser Redpolls.

The only note heard was a *chup-chup* call. Feeding visits were made at roughly half-hour intervals. The birds stayed at the nest for only about a minute on every occasion and were not to be seen in the area between visits. Photography was handicapped by the large size of the young which meant that approach near to the nest had to be restricted for fear of their "exploding". They had fledged successfully by the evening of 26th May. The empty nest was then collected and kept.

On 27th May another Redpoll nest was found and a hide was erected again at four feet. These birds were typical Lesser Redpolls, however, and we were impressed by the difference between them and those we had watched earlier. Their nest was also in a juniper bush, but was typical of that of *disruptis*.

The Handbook states that, generally speaking, field identification of *rostrata* cannot be relied on, especially as problematical intermediates occur. Our conditions of observation were, however, more comparable with watching captive birds, and the difference between the Greenland-type Redpolls and the typical Lesser Redpolls examined under the same conditions only a very short time afterwards cannot be over-emphasised. Photographs of one of the birds at each nest are reproduced on plates 40 and 41.

R. K. MURTON and S. C. PORTER

[The Redpolls are a complicated group and, in connection with this interesting note, we asked Kenneth Williamson to prepare the review of their taxonomy which appears on pages 238-241.—EDS.]

White-crowned Sparrow crossing Atlantic on board ship.—On 30th May 1948, when we were a day out from Newfoundland on board the S.S. *Nova Scotia* bound for Liverpool, a White-crowned Sparrow (*Zonotrichia leucophrys*) attached itself to the ship. It remained with us for several days, until the morning Ireland appeared on the horizon. We then saw it no more, and it is a safe conclusion that, seeing land, or sensing the proximity of land, the sparrow went off to fend for itself. It might have reached anywhere in Ireland, Scotland or England. During its time on board, it would often disappear for long periods, either riding on some other part ot the ship or flying at large over the water, but always returning to the vessel sooner or later, until the last morning. Other passengers supplied it with vast amounts of food and water, enough to satisfy a pelican! There was no difficulty about the identification, for its clearly striped black and white crown

and the absence of the snowy white throat patch found in the White-throated Sparrow (*Z. albicollis*) established this beyond doubt.

I am very familiar with the more common White-throated Sparrow and I have a pencilled note to the effect that one came aboard the M.V. *Erria* when I was crossing the Atlantic in a westerly direction in October 1943. Unfortunately, however, I have no further details of this and only just remember the occurrence. At that date we were expecting a different sort of visitation! Nevertheless, this record also supports the contention that many more birds than is generally realised make use of ships crossing the Atlantic. My own opinion is that, in almost every case, the small American Passerines found in Britain and Ireland have had an assisted passage. A. L. PARISH

[We are always glad to receive records of American birds crossing the Atlantic in this way. Two White-throated Sparrows made the crossing on board ship in October 1957 (*Brit. Birds*, 51: 358) and there have been several similar records of Myrtle Warblers (*Dendroica coronata*) and other species (e.g. *Brit. Birds*, 52: 237-238).—EDS.]

Review

Instructions to Young Ornithologists. II. Bird Behaviour. By Derek Goodwin. Museum Press, London, 1961. 123 pages; 11 line drawings and 17 half-tone illustrations. 12s. 6d.

The rather dry title and conventional jacket of this unassuming work conceal an eminently readable and highly competent introduction to bird behaviour—the first (and, we hope, not the last) book by a man who more than anybody else has a claim to the title of the "British Heinroth". Like his great predecessor, Derek Goodwin has a wide and accurate first-hand knowledge of the behaviour of birds, and of other aspects of their everyday life. He, too, has acquired this knowledge by raising and keeping many species, and by intently watching them in zoos and in the wild. He has the same extraordinary gift of observation, and of engraving details in his memory. He has the same ability to say biologically significant things in simple, yet perfectly clear language. A visit by Derek Goodwin is like an ornithological Christmas dinner—the food is tempting and super-abundant, but one needs time and energy afterwards to digest the almost overwhelming mass of solid stuff.

Goodwin also shares with Heinroth a certain dislike of theorising; and his interest in analysis has its limitations. Consequently, his book does not penetrate deeply into any problem. But its strength lies in the wealth of data concerning two "first steps" of analysis: it stresses

the biological adaptations of many behaviour patterns; and it demonstrates time and again that much behaviour does not show insight and is very often not even learnt, but "instinctive". And these things are shown extremely well. Throughout the book one senses Goodwin's delight in rediscovering these basic truths again and again in the wide variety of behaviour patterns he has himself studied.

One might ask whether, in restricting himself to these relatively simple levels of inquiry, Goodwin has not underrated the intellectual abilities of "young ornithologists" (whose age is not mentioned, I suppose because there can be no limit!). His justification is, I believe, that by performing his restricted task with such accomplishment he puts across one fundamental message that is as important now as in Heinroth's time: that to study behaviour patterns as parts of adapted systems in a great variety of animal types is to enter a biological wonderland of great beauty. By thus arousing interest (almost by hidden persuasion) rather than, as the publishers required, by "instructing", Goodwin may well influence young biologists to a greater extent than more professional or more technical writers could do.

N. TINBERGEN

Letters

The need for distinctive bird-names

Sirs,—Two centuries ago the shores of Britain formed a horizon that was more than ample for a parochial bird-watcher like Gilbert White. The birds found within that horizon in his day were naturally considered "British" birds—as distinct from those exotic birds of which an occasional specimen might turn up, like a shipwrecked mariner, on British shores.

I suggest that this has now changed, that the horizon of most British bird-watchers has been expanded to include a large part, at least, of Continental Europe. A relic of the past persists, however, in some of the common English names of the birds that must now be regarded as cosmopolitan. When the bird-watcher's vision did not ordinarily extend beyond Britain, it was quite all right to call *Ardea cinerea* simply "the Heron", as if there were no other species of *Ardea* from which it had to be distinguished; it was all right to call the Bittern "the Bittern", the Buzzard "the Buzzard", the Swift "the Swift", the Treecreeper "the Treecreeper", the Wheatear "the Wheatear", and so on. Since each was the only one of its kind within the established horizon, there was no need for distinguishing adjectives. Within today's new horizon, however, there is such a need. It is excessively

awkward, for example, for the English-speaking bird-watcher in the Alps, where Alpine Choughs are common, to refer to the other Chough simply as "*the* Chough" (bearing down hard on the article) or as "the common Chough", particularly as it is so uncommon there. It is also excessively awkward on the Swiss lakes, where Black Kites are common in summer, to refer to the other Kite as "*the* Kite" or "the common Kite", when it appears there only as a rare migrant.

It would not be hard to correct this situation. The competent authorities could assign a qualifying adjective to every species that now lacks one, where there is a possibility of confusion with other members of the family. (This might be welcome even to the stay-at-home Briton in the cases of the Redstart and the Whitethroat.) Thus what is now "the Kite" might become "the Red Kite" and "the Heron" might become "the Grey Heron" (or "the Great Grey Heron", to hold its own with the American "Great Blue Heron"). This would impose no burden on the tongues of bird-watchers in Britain, because in the normal course of events they would presumably continue to refer to, for example, "the Heron"—in the same way as the Eastern Meadowlark is called simply "the Meadowlark" in eastern North America, where there is no other Meadowlark. We English-speaking bird-watchers outside Britain, however, would be relieved of an annoying nomenclatural awkwardness. LOUIS J. HALLE

The "Lesser Scaup" affair

Sirs,—In a previous protest (*Brit. Birds*, 54: 167-168) at the shooting of the Sutton Courtenay duck which was at first thought to be a Lesser Scaup (*Aythya affinis*) and which is now regarded as a hybrid Tufted Duck × Pochard (*A. fuligula* × *A. ferina*) (*Brit. Birds*, 54: 49-54), I pointed out that those concerned had overlooked opportunities for further examination that the taking of the bird provided. I suggested that a study of the haemoglobin and serum components, and also of the chromosomes, might well have afforded a means of testing the hybridity hypothesis and perhaps of identifying the parental species.

It has since been put to me that further shooting would have been required to provide comparative material. This is not necessarily so. The chromosomes in testicular preparations from the original bird might have provided definitive evidence of F_1 hybridity and it is possible that sufficient additional serological information for a useful comparison could have been obtained from a single live bird of each of the parental species. C. E. FORD

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